

CLAIMS

1. A control method for an electrically activated mechanism that adjusts cam phase in an internal combustion engine, comprising the steps of:
 - measuring said cam phase and forming a closed-loop control signal for activating said mechanism based on a deviation of the measured cam phase from a requested cam phase, and one or more closed-loop gain terms;
 - 5 determining a rate of response of cam phase adjustment in response to a requested change in cam phase;
 - comparing said determined rate of response to one or more rate thresholds defining a nominal rate of response; and
 - 10 adaptively adjusting said closed-loop gain terms in a direction to increase a response rate of said mechanism if the determined rate of response is below said nominal rate of response.
2. The control method of Claim 1, including the steps of:
 - determining an estimate of an operating parameter of said mechanism based in part on a set of stored parameter values;
 - 5 calibrating closed-loop gain terms as a function of said operating parameter, and retrieving calibrated closed-loop gain terms from a memory device based on said estimate; and
 - adaptively adjusting said stored parameter values in a direction to increase the retrieved closed-loop gain terms if the determined rate of response is below said nominal rate of response.
- 10 3. The control method of Claim 2, where said operating parameter is an oil pressure supplied to said mechanism.

4. The control method of Claim 2, wherein said stored parameter values are adjusted by an amount based on a deviation of the determined rate of response from said nominal rate of response.

5 5 5. The control method of Claim 1, including the steps of:
 storing calibrated values of said closed-loop gain terms based on operating parameters of said engine and said mechanism; and
 adaptively adjusting the stored calibrated values in a direction to increase a response rate of said mechanism if the determined rate of response is below said nominal rate of response.

5 5 6. The control method of Claim 1, including the step of:
 determining said rate of response of cam phase adjustment based on a time interval that starts when said measured cam phase begins to change toward said requested cam phase and that ends when said deviation of the measured cam phase from the requested cam phase falls below a threshold.

7. The control method of Claim 6, including the steps of:
 determining a change in cam phase that occurs during said time interval;
 and
 disregarding the determined rate of response if the determined change in cam phase differs from said requested change in cam phase by at least a predetermined amount.

5 5 8. The control method of Claim 1, including the steps of:

defining said nominal rate of response in terms of a first rate threshold that establishes a slower than nominal rate of response and a second rate threshold that establishes a faster than nominal rate of response; and

- 5 adaptively adjusting said closed-loop gain terms in a direction to increase a response rate of said mechanism if the determined rate of response is between said first rate threshold and said nominal rate of response.

9. The control method of Claim 1, including the steps of:

defining said nominal rate of response in terms of a first rate threshold that establishes a slower than nominal rate of response and a second rate threshold that establishes a faster than nominal rate of response; and

- 5 adaptively adjusting said second rate threshold in a direction to increase said nominal rate of response if the determined rate of response is higher than said second rate threshold.